

NOTES ON THE HUMAN GEOGRAPHY OF AN OIL FIELD

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INTRODUCTION

THE following discussion, which relates particularly to petroleum, but in many of its aspects applies as well to natural gas, is an attempt to present from the standpoint of one phase of modern geography certain characteristic features associated with the development of an oil field. The particular human "responses" commonly associated with oil are described, analyzed, and their causal relation to the basic facts concerning the nature and occurrence of the resource demonstrated. The discussion is based on the idea that these human responses include any distribution of population, either permanent or temporary; any grouping or arrangement of cultural features such as buildings, roads, etc., or any peculiarities, either physical or psychological, of man himself which are characteristically and causally associated with, and controlled by, a natural resource or such other basal geographic elements as topography, soils, climate or location. These responses demand description and their causal relations call for demonstration and analysis.

Each of the natural resources utilized by man necessarily exerts an influence whose character and strength depends, in the main, on the nature of the resource—its distribution; its physical properties, and the means by which it is procured. All these determine in large measure the part which it plays in the life of man and in the geography of the region where it occurs.

SIGNIFICANCE OF NATURE AND MODE OF OCCURRENCE OF OIL

Two peculiarities of the mode of occurrence of oil are among the prime factors upon which its geographic significance depends: These are (1) its occurrence deep down within the earth entirely out of sight, often with no surface indications of its presence, and (2) its localized distribution within the general producing area. The combined effect of these peculiarities is to introduce into the prospecting for and development of oil fields a strong element of uncertainty and risk of loss while at the same time the nature of the resource insures an easily gained fortune to those who make a lucky strike. The effect, in short, is to introduce a strong gambling element, and to promote the "boom" or "rush" response wherever a successful field is found.

Before proceeding to the discussion of these responses it might be well to consider a little more closely the factors mentioned above. In most cases the oil lies far underground and gives no direct indications at the surface of its presence below. Occasionally a seepage at some spring or watercourse attracts attention and leads to drilling, but in many cases the discovery is entirely accidental—made in the course of drilling for water or of random prospecting for oil. Whether or not oil will be found in an untried area becomes, then, in the absence of expert examination, merely a gamble. The invisibility of the oil-bearing sands tend to increase the element of mystery which, in the popular mind, is likely to be associated with the whole subject

of the distribution of oil and thereby to increase the effectiveness of the gambling element connected with its development.

Further, the laws of accumulation of oil are such that its distribution is often exceedingly irregular, even within the general oil field. Producing wells and dry holes occur in close proximity and even on adjoining locations. In most fields the oil is found only where the rock structure is favorable for its accumulation in considerable quantities. Such structures are the crests of anticlines and domes or places where dipping rocks locally flatten out into terraces. Wherever ground water is present, oil, being lighter than water, tends to migrate up the dip of the rocks. Wherever, in its upward migration, it encounters such structures as those mentioned, especially if they include an impervious stratum, it tends to accumulate.

Even favorable structures, however, do not yield oil in quantities unless a porous stratum is present which is capable of holding the oil and delivering it quickly when a well is drilled. Moreover, oil is not always found even in cases where a suitable "sand" is present and structures are favorable, for a break in the impervious stratum above, or various other conditions may have allowed its escape. Thus, even after examination of the structure by a trained geologist, a considerable element of uncertainty necessarily enters into the search for oil.

THE "RUSH" RESPONSE

The first well in an untried region is almost a pure gamble and its sinking is accompanied by many of the features of a gamble. Curiosity is rife and the well is constantly visited by a throng from far and near. At one such well a booth established for the sale of soft drinks to the visitors seemed to be flourishing. When the well approaches the depth which it is expected will determine whether or not it is to be successful, the excitement increases. Amidst a crowd of expectant onlookers drilling is continued throughout the night by the aid of torches. Should the well prove successful the rush begins. Quickly the news spreads to all the country round. There is a scramble to secure leases on farms situated near the successful well. Oil men from far and near come in, each vying with the others to obtain favorable leases. Speculators lease large tracts in the hope of disposing of them at a profit to some one of the bona fide oil companies in case the field develops as is hoped. All the towns in the neighborhood become the centers of ceaseless activities; hotels are crowded; garages are filled to overflowing; even the railroads are forced to extra efforts in order to accommodate the increased traffic involved in the bringing in of the necessary drilling outfits, casing, and other supplies. Drilling outfits are put into position with feverish haste, each company endeavoring to get its wells down first to reap the benefit of the greater flow which comes from the first wells, and which may be greatly cut down as neighboring wells are sunk. Soon the oil field becomes a forest of derricks.

Following the rush to the immediate neighborhood of the first well, there usually comes more or less of the so-called wild-catting—the sinking of

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wells in surrounding territory in the hope of striking new fields, or of locating the continuation of the main field. The most striking characteristic of this wild-cattling is its blind, groping nature, and the predominating element of pure gamble which is, therefore, involved. This is especially conspicuous in such a region as Illinois, since the glacial drift obscures the underlying rock structure—the only possible guide which might be used in the intelligent location of outlying wells. It is true that the geologist is now being called upon to some extent to determine in advance the structure of the area, and therefore the most favorable locations for development work, but in most cases the blind and expensive method of cut and try is still in vogue.

Interesting psychological responses associated with the gambling element already described are almost invariably noticed in connection with a newly opened oil field. Excitement is in the air, everyone is talking oil, and every stranger is suspected of being an oil man seeking leases. Almost every landowner for miles around will tell you that somewhere on his place, in a well or spring, or along a stream, there is a peculiar scum on the surface of the water, which he is sure is oil.

Another of these responses probably has its root in the obscure and, to the lay mind, rather incomprehensible facts controlling the distribution of the oil. Practically without exception, the landowner on whose farm a dry hole has been put down will assure you with the utmost confidence that he is certain the drillers struck oil in that well, but are concealing the fact. He cannot see any reason why oil should be found on his neighbor's farm, but not on his own, and he is suspicious of everyone.

INFLUENCE OF TOPOGRAPHY

In a district already proven, topography plays a subordinate part in the location of individual wells, since, as a rule, there is no necessary connection between the underground structure, which controls the distribution of the oil, and the surface topography. Topography does, however, effect the depth to which it is necessary to drill, and the ease with which the drilling materials may be put in place. It is also an important element to be considered when it comes to the question of installing the pumping apparatus to be described in a following paragraph.

Topography seems to exert a marked influence on the location of the wild-cat wells, at least those whose sites are chosen by the old blind method, for, since it is in the valley bottoms that the amount of rock drilling necessary to reach a given stratum is least, it is there that the majority of the wild-cat wells are located.

CULTURAL FEATURES

Besides the "rush" response, whose geographical basis we have just outlined, a successful oil field calls into being a number of distinctive cultural features which must be considered as geographical phenomena associated with, and dependent upon, the exploitation of this particular resource. The forest of derricks, already mentioned, which is so conspicuous, though transient, a feature in certain oil fields, is of course a response to the necessity of drilling

to secure the oil. Probably the next most striking features, which include the pumping house and the arrangements for pumping the wells, result from the necessity, at least in most fields after the first few days, of pumping the wells in order to maintain a continuous flow of oil. From the pumping house, which is usually a rather plain structure, large enough to house a good-sized oil engine with various accessories, there radiates to the wells a series of "pull rods" connected with them by an arrangement, the "jack" whereby a pull on the rod actuates the pump. At the pumping house the rods are hooked to a large drum, the pull wheel, which, as it constantly turns back and forth through about one-fifth of its circumference, gives the necessary pull to the pumping rods. These rods must be kept fairly straight, hence in rough country considerable difficulty may arise. Where the country is not too rough they are supported on stakes driven into the ground to such a depth that their tops give the desired gradient. The squeaking of the pumps, and of these rods as they move back and forth over the tops of the stakes, is an exceedingly characteristic sound in an oil field, as is also the constant chug-chug of the pumping engine.

Besides the pumping house, rods and jacks, there is usually associated with each group of wells, at least with the wells of each distinct company in the field, one or more tanks for the storage and measurement of the oil before it is pumped away through the underground pipe lines to distant refineries or storage tanks. In addition there is likely to be found at some point convenient to a railroad in the neighborhood of any large oil field, a so-called tank farm, which is merely a considerable area given over to the storage of oil. Such a farm may number hundreds of steel tanks, each nearly a hundred feet in diameter and about thirty feet in height, set at nearly uniform distances of about three hundred feet from each other for protection in case of fire. Such a tank farm is a sight calculated to impress one in a never to be forgotten way with the enormous amount of liquid fuel which is wrested from the earth in some of these larger oil fields.

Pumping arrangements, settling tanks, pipe lines, storage tanks and tank farms all must be looked upon as responses induced by the liquid nature of the resource, and quite different from those associated with resources of other kinds.

After the first boom of a new field is over, and most of the drilling is done, the human response to oil contrasts strongly with that to coal, iron or most of the other mineral resources. In the case of coal, there are the mines with their extensive buildings and equipment, the railways and tram-roads, and finally the mining town with its more or less characteristic population. Such resources draw to themselves a considerable permanent population. Not so with oil: One or two men at each of the pump houses, and a few gangs engaged in repairing pumps, pipe-lines, etc., constitute nearly all the people who remain in the field after the drillers depart.

INFLUENCE UPON AGRICULTURE

When it happens that an oil field is discovered in the midst of a good

farming region, the influence of its development upon agriculture is striking and usually deplorable. The large sums of money which the owners of the farms often receive from leases or in royalties not infrequently result in the farmer's moving to town, leaving the farm to a tenant, or even in extreme cases, abandoning it altogether. Fields completely run to weeds, unkempt fences, and uncut crops were most common features in one such area recently visited. The gambling spirit and the spirit of "get rich quick" which certainly is very pronounced in the early history of an oil field, must be presumed to have their influence upon such farmers as remain and to discourage the hard labor necessary to secure the slow but surer rewards of farming.

Aside, however, from such psychological effects, the development of an oil field exerts in a most practical way its detrimental influence upon the agriculture of the region, for the derricks, the wells, and the numerous pumping rods radiating in all directions from the pumphouses interfere very seriously with the cultivation of the land and, in some cases, where the wells are thick, actually make cultivation almost impossible except by hand—a method which is not likely to be used extensively in this country for some time to come. Furthermore the waste oil and salt water escaping from the wells is often a source of serious injury to growing crops. After the productive life of a field has passed and the derricks, pumping apparatus, tanks and other accompaniments have been removed, agriculture regains, gradually, its former importance, but the recovery is apt to be slow.

SUMMARY

With the discovery and exploitation of an oil field there are associated a number of phenomena which may be interpreted as responses to oil as a factor of geographic environment. Chief among these responses may be mentioned:

1. The boom or rush which commonly follows the opening of the field and is accompanied by a strong gambling spirit with its usual train of consequences.

2. Characteristic cultural features among which the most important are included under the items of working equipment such as derricks, pumping houses, rods and jacks, tanks, pipelines, etc.

3. The scant permanent population attracted by oil as compared with other mineral resources such as coal, iron, or zinc.

4. The demoralization of agriculture.

5. More or less well defined psychological effects.

At the basis of these responses seem to lie the following facts concerning the nature and distribution of oil:

1. It lies buried out of sight within the earth.

2. Its mode of accumulation is such that its distribution is often patchy and difficult to predict.

3. The two preceding features introduce a strong element of uncertainty and risk into its development.

4. It is a liquid—a fact which introduces many special features into the method of handling it.

5. It frequently requires to be pumped from the wells.

6. It has a high value and at the same time may, under favorable circumstances, be secured at comparatively little expense—hence the lure of easily acquired wealth.



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